

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY



(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 28 JUL 2006

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Applicant's or agent's file reference L3453PPCT	<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/US2005/009678	International filing date (day/month/year) 24.03.2005	Priority date (day/month/year) 01.04.2004	
International Patent Classification (IPC) or national classification and IPC INV. B29C33/40 B29C33/42 B29C33/56 B29C41/20 B29C33/38			
Applicant 3M INNOVATIVE PROPERTIES COMPANY			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  26.01.2006		Date of completion of this report  27.07.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized officer  Mathey, X  Telephone No. +31 70 340-2686 	

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/US2005/009678

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on
- ☒ the international application in the language in which it was filed
  - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
    - ☐ international search (under Rules 12.3(a) and 23.1(b))
    - ☐ publication of the international application (under Rule 12.4(a))
    - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

**Description, Pages**

1-24 as originally filed

**Claims, Numbers**

1-22 filed with telefax on 06.07.2006

**Drawings, Sheets**

1/5-5/5 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1-22
	No: Claims	
Inventive step (IS)	Yes: Claims	8-10,19
	No: Claims	1-7,11-18,20-22
Industrial applicability (IA)	Yes: Claims	1-22
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

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**Box No. VII Certain defects in the international application**

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The following defects in the form or contents of the international application have been noted:

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

Re Item V.

- 1 Reference is made to the following documents:  
D1 : WO 2004/010452 A (3M INNOVATIVE PROPERTIES COMPANY;  
YOKOYAMA, CHIKAFUMI; KAWAI, TAKAYUKI) 29 January 2004 (2004-01-29)  
D2 : US 5 443 774 A (KLUEH ET AL) 22 August 1995 (1995-08-22)

2 INDEPENDENT CLAIMS 1, 19 AND 20

The following is stated under reference to item VIII, whereby it is to be noted that unclear features cannot be used for unambiguously distinguishing over prior art in order to assess novelty or inventive step in the sense of Article 33 PCT.

- 2.1 Document D2 discloses (the references in parentheses applying to this document) a mold (4) comprising  
a support (3) comprising a composite material of a polymeric material and a reinforcing material blended with the polymeric material,  
and a shape-imparting surface layer (2) disposed on the support,  
see col.2, line 61-col.3 line 5 and fig. 1-2.

The subject-matter of claim 1 differs thus from that of D2 in that the proportion of reinforcing material is 20 to 70 percent volume based on the composite.

Therefore the subject-matter of claim 1 is novel in the sense of Article 33(2) PCT.

The problem solved by these special technical features can be construed as achieving dimensional stability of the support. However, the range of values given, 20 to 70 percent volume, falls within what a skilled person would try without exerting an inventive activity: it is well known that if the content of reinforcement is too low, it will not be efficient for reinforcing, and that above a certain value, the cohesiveness of the mixture can be compromised. It would thus be more surprising to choose *outside* than inside this range.

Therefore claim 1 does not fulfill the requirements of Article 33(3) PCT.

- 2.2 Document D1 discloses a method of making a microstructured article comprising providing a mold (10), disposing a curable material (33) between a substrate (31) and the shape-imparting microstructured surface layer (3) of the mold (10), curing the curable material (33) and removing the mold (10), see page 15, line 14 -page 16, line 29, and fig. 8d, 9e-9g.

Therefore, the subject-matter of claim 19 differs from that of D1 in that the mold is a mold according to claim 1.

The subject-matter of claim 19 is thus new in the sense of Article 33(2) PCT.

The problem solved by these features can be construed as providing an alternative mold suitable for this method.

Even though D2 describes a mold very similar to that of claim 1, the disclosed uses for such a mold however do not suggest that it would be suitable for making a microstructured article by the method of claim 19.

Therefore, *and provided the issue raised under item VIII.3 is resolved*, the subject-matter of claim 19 can be considered as inventive (Article 33(3) PCT).

- 2.3 Document D1 discloses (the references in parentheses applying to this document) a method for producing a flexible mold comprising providing a master (5) having on a surface protrusion pattern (14,15), applying a curable resin composition (3) to the surface protrusion pattern of the master mold to form a shape-imparting layer precursor, providing a support layer (1,2) on the shape-imparting layer wherein the support layer comprises a composite material of a polymeric material and a reinforcing material, curing the curable resin and releasing the shape-imparting layer together with the support from the master mold (5), see page 11, line 21- page 13, line 4 and fig. 5a-5c, 6d-6e.

The subject-matter of claim 20 thus differs from that of D1 in that the reinforcing material of the support layer is blended with the polymeric material, in a proportion of 20 to 70 percent volume based on the composite.

Therefore, the subject-matter of claim 20 is new in the sense of Article 33(2) PCT.

The problem solved by these features can be construed as providing an alternative type of reinforcing support layer.

As disclosed on page 10, line 14 of the present application, the flexible mold is produced by known methods. The use of a composite support having a reinforcing material blended with the polymeric material is well known from D2, see point 2.1 here above. For the reasons already exposed, the choice of this type of material in the range of proportion as claimed cannot be considered to involve an inventive activity.

Therefore, claim 20 in its current wording does not fulfill the requirements of Article 33(3) PCT.

**3. DEPENDENT CLAIMS 2-18, 21, 22.**

3.1 In view of the defects found under point 2 here above and item VIII hereunder, the examining instance cannot presently find a ground for the selection of one or more of the additional features as listed in claims 2-7, 11-18 and 21-22 in order to support the presence of an inventive step. As a consequence, claims 2-7, 11-18, 21 and 22 do not meet the requirements of Article 33(3) PCT.

3.2 Concerning the disclosure of the additional features of claims 2-18, 21, and 22 as such, reference is made to the international search report and the relevant passages of the cited documents in reference to the claims.

3.3 It is to be noted that the subject-matter of claims 8-10 appear to fulfill the requirements of Article 33(3) PCT: The underlying problem, as mentioned on page 5 of the description, appears to be ensuring dimensional stability in response to changes in humidity. The selection of materials as present in claims 8-10 in order to achieve this goal is neither disclosed nor suggested in the available prior art.

**4. Claims 1-22 fulfill the requirements of Article 33(4) PCT.**



Re Item VII.

1. At present it cannot be stated which of the afore mentioned documents represents the closest prior art. However, in accordance with the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in such a document should be mentioned in the description, and such a document identified therein.

Re Item VIII.

The application does not meet the requirements of Article 6 PCT, because the claims are not clear.

1. In claim 8, the expression "the group consisting ***essentially*** of" raises the doubt in the mind of the reader whether the list of materials contained in said group is complete, or if there could be other materials as well, see PCT Guidelines 5.40.
2. In the description, page 13, lines 17-24, the applicant raises the possibility of an alternative in which the presence of a composite material of a polymeric material and a reinforcing material is not required. This raises doubt as to whether the composite nature of the support is an essential feature of the subject-matter for which protection is sought, see PCT Guidelines 5.15, 5.33.
3. Claim 19 refers to a method using the mold of claim 1. However, the shape-imparting surface layer of this mold is referred to as "*microstructured*", which casts a doubt as to whether the term "*microstructured*" is essential to the claimed invention, since it is absent from claim 1. This doubt is aggravated by independent claim 20, relating to the manufacturing of a mold, which also fails to include this term. Therefore the application as a whole fails to meet the requirements of Article 6 PCT.
4. In claims 14 and 16-18 the subject-matter is not correctly defined, since the wording "having a coefficient of hydroscopic swelling of less than..." merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result. As a result these claims, and by consequence claim 15 as dependent from claim 14, are not clear.

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06. Juli 2006

What is claimed is:

1. A mold comprising:

a support comprising a composite material of a polymeric material and a reinforcing material, and  
*✓ blended with the polymeric material*

a shape-imparting surface layer disposed on the support.

2. The mold of claim 1 wherein the mold is flexible.

3. The mold of claim 1 wherein the shape-imparting surface layer is microstructured.

4. The mold of claim 3, wherein the microstructured surface comprises a groove pattern.

5. The mold of claim 3, wherein the microstructured surface comprises a protrusion pattern.

6. The mold of claim 3, wherein said reinforcing material comprises an inorganic material, an organic material, a metal material, a metal oxide or a mixture thereof.

7. The mold of claim 6, wherein said reinforcing material is a fiber.

~~8. The mold of claim 1, wherein the composite comprises the reinforcing material in an amount of 20 to 70 percent volume based on the composite of~~

8. The mold of claim 1, wherein said polymeric material is selected from the group consisting essentially of a polyolefin, a polyvinyl chloride, a polystyrene, a polycarbonate, a polyethylene terephthalate, a polybutylene terephthalate, a polyether sulfone, a polyphenylene sulfide and a liquid crystal polymer.

9. The mold of claim 8, wherein said polyolefin is a polypropylene or a cycloolefin.

10. The mold of claim 1, wherein said composite material comprises polypropylene and



06-07-2006

US2005009678

WO 2005/097449

PCT/US2005/009678

glass fiber.

~~11~~ <sup>12</sup> 12. The mold of claim 1, wherein said shape-imparting layer comprises a cured resin composition.

~~12~~ <sup>13</sup> 13. The mold of claim 12, wherein said cured resin composition is photocured.

~~13~~ <sup>14</sup> 14. The mold of claim 3, wherein the microstructured surface is a protrusion pattern corresponding to barrier ribs for a back plate of a plasma display panel.

~~14~~ <sup>15</sup> 15. A mold <sup>according to claim 1</sup> comprised of a polymeric material having a coefficient of hygroscopic swelling of less than 7 ppm per percent relative humidity.

~~15~~ <sup>16</sup> 16. The mold of claim <sup>14</sup> ~~15~~, wherein the mold comprises a shape-imparting microstructured surface layer suitable for making barrier ribs.

~~16~~ <sup>17</sup> 17. The mold of claim <sup>15</sup> ~~16~~, wherein the coefficient of hygroscopic swelling is less than 5 ppm per percent relative humidity.

~~17~~ <sup>18</sup> 18. The mold of claim <sup>15</sup> ~~16~~, wherein the coefficient of hygroscopic swelling is less than 3 ppm per percent relative humidity.

~~18~~ <sup>19</sup> 19. The mold of claim <sup>15</sup> ~~16~~, wherein the coefficient of hygroscopic swelling is less than 1 ppm per percent relative humidity.

~~19~~ <sup>20</sup> 20. A method of making a microstructured article comprising  
providing the mold of ~~any of claims 1 to 14 or 16 to 19~~;  
disposing a curable material between a substrate and the shape-imparting  
microstructured surface layer of the mold;  
curing the curable material; and  
removing the mold.

06-07-2006

US2005009678

WO 2005/097449

PCT/US2005/009678

20 21. A method for producing a flexible mold comprising:  
providing a master mold having on a surface protrusion pattern;  
applying a curable resin composition to the surface protrusion patter of the master  
mold to form a shape-imparting layer precursor;  
5 providing a support layer on the shape-imparting layer wherein the support layer  
comprises a composite material of a polymeric material and a reinforcing material, <- >  
curing the curable resin; and  
releasing the shape-imparting layer together with the support from the master  
mold.

10 21 22. The method of a claim <sup>20</sup>21 wherein the support is a preformed film.

22 23. The method of claim <sup>20</sup>21 wherein the preformed film comprises a primer layer and the  
primer layer in place in contact with curable resin of the shape-imparting layer.

< blended with the polymeric material >